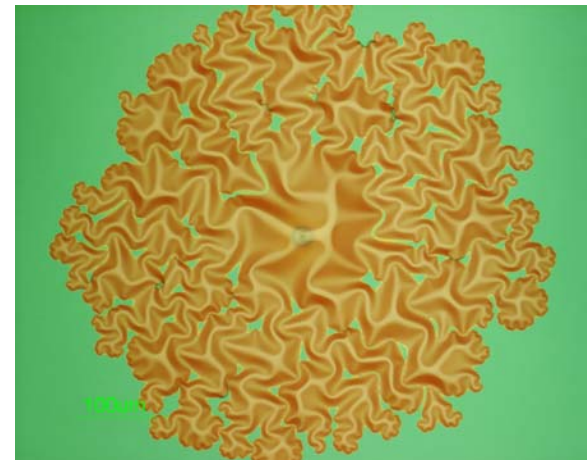


A confocal sputter deposition system with in-situ stress gauge for thin-film research and education

A tool for the deposition of thin film alloys and multilayers: The deposition system is designed specifically for the deposition of alloy coatings that require a high degree of composition control. This is of paramount importance when growing coatings of functional materials such as NiTi shape memory alloys or ferro-magnetic Fe_3Pd , where equilibrium phases and transformation temperatures vary greatly with small shifts in composition. In addition to research projects on functional coatings, the system is also used in a study of the [adhesion of capping layers](#) to ceramic films with low dielectric constants that are being considered for use in the semiconductor industry.

Integration of the new low-k dielectrics in a semiconductor process flow requires good adhesion between the dielectric and the various barrier films used in the integrated circuit. Delamination of these barrier films is a process that depends greatly on environmental factors such as water vapor pressure or pH. The figure illustrates the buckling delamination of a compressive SiC film on an organosilicate glass.



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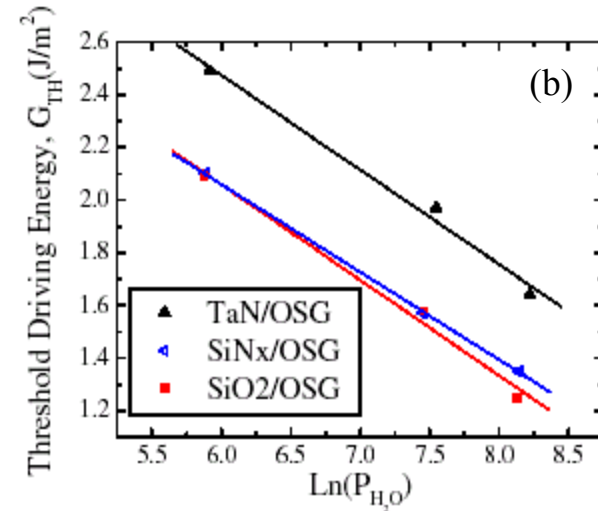
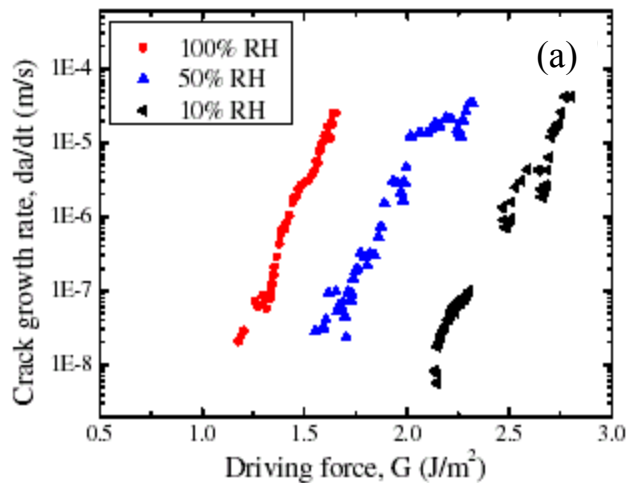


Illustration of the dramatic effect of environmental factors on the delamination of various barrier films on organosilicate glass (OSG): (a) Subcritical crack velocity as a function of applied crack extension force and relative humidity; (b) Effect of water vapor pressure on the threshold for cracking; (c) Effect of pH on the threshold for cracking in aqueous environments.

